SciCo Training

CDF Operations

Last updated April 26, 2007

Overview of SciCo responsibilities

- You are the leader of the shift crew!
  - Direct shift crew to carry out plan from OpsManager as described on the white boards
  - Allocate resources within OpsManager plan
  - Communicate with Crew including CryoTech and MCR
  - Oversee shot setup
  - Lead the investigation of problems
- Responsible for Emergency response
- Work closely with CO to ensure detector is working properly
- Ensure that data is being taken efficiently
  - Instill a sense of urgency to crew
  - Page experts and OPs Manager day or night
- Enforce proper e-log documentation

General Shift Responsibilities

- Report at the daily 8:00 operations meeting (owl/day)
- Read the shift e-log from previous shifts (including your own last shift – sometimes experts add comments later)

- Emergency response
  - You should have already had specific training from Steve Hahn

- iFIX pc's: the SciCo has the username and passwords needed for these

Marking runs good or bad in the database

- Your overlap SciCo should show you how to do this
- If you are unsure of whether a detector should be marked good or bad, bring it to the attention of experts directly and at the 8:00 operations meeting
  - If a component is bad enough to be marked “bad” the experts must be paged if they are not already aware of it
- Check for unmarked runs from the previous shift and mark them if you are able

E-log documentation

- Make sure experts document all work clearly in the shift e-log
- Logbook entries should have the expert's name, not "expert". When an expert calls, make sure to get his/her name before passing the call to an Ace. Make sure you understand what the action to be taken is, if necessary by talking to the expert yourself.
- Detailed descriptions of problems and troubleshooting make it easier for experts to understand what happened and for future shift crews to solve the same problem more quickly

SciCo E-log Entries

- Many people are watching eLog from afar. Concise and timely entries about developing problem may get shift crew help even before experts are paged. Ace should be making detailed entries but may need help getting initial details into eLog.
- Try to eLog all calls/pages to experts. Enter who you called, when, and why.
- Try to eLog names and times of experts who respond to pages.

E-log shift summary

- A good summary makes it much easier for others to quickly learn the events of the shift (helps fellow SciCos!)
- Your e-log shift summary should document all significant occurrences during your shift. It should give the current status and plan, and any outstanding issues.
- Helpful hints:
  - A good summary makes it much easier to cover the events in the 8:00 meeting
  - Keeping a running list of events during your shift on paper or in a text editor can speed making your summary

Power supply monitoring

- The cryo tech is newly responsible for (low voltage) power supply monitoring (PSM)
- If an electronics readout crate in the collision hall needs to be powercycled, call cryo and ask them to do it
  - If the cryo tech is unavailable*, there are instructions on the Ace web page
- If an expert is working on a crate upstairs and turns it off, cryo will get a PSM alarm. Please call the cryo tech ahead of time if you know an expert will be powercycling a crate.
- Note that the cryo tech is not always in the cryo area (e.g. could be in the gas shed across the berm)
  - Try the intercom or the cryo pager

Shot Setup

- Prior to, or early in shot setup:
  - Make sure calibrations have been taken recently
    - if not, direct the shift crew to do as many as possible (there is almost always a short period of quiet time at the beginning of shot setup, even if MCR does not promise any)
  - No-beam trigger table tests can also be done if requested
  - Make sure no one is or has been doing work which might cause problems at the beginning of the store
  - If work has been done between stores, make sure you know where to look for potential problems and whom to contact
- Note when final protons/pbars are being loaded and page experts as requested on the white board

Shot Setup – turning on

- When MCR calls to announce that scraping is complete, ask the Ace to turn on CLC HV and notify MCR as soon as the HV is up – make a note of the initial luminosity
- Keep an eye on beam losses (TevMon) along with the Ace. The Ace should turn on:
  - "Step 2" HV immediately after "Step 1" (CLC) provided **LOSTP+LOSTPB<50kHz**
  - silicon HV as soon as **TevMon turns green and the losses appear stable and <5kHz**.
- The Ace should start the run as soon as all HV is up.
- You are responsible for ensuring that data is being taken efficiently. This includes instilling a sense of urgency to the shift crew. A minute of downtime at the beginning of the store can cost as much as 10 minutes at the end of the store.

Shot Setup – taking data

- Once the run starts taking data, check the L3 display and the deadtime to make sure the deadtime is not unreasonably high (the Aces should have a feel for this).
  - If it is high, work with the Ace and CO to determine the source. Page trigger and/or relevant detector/DAQ experts for help.

- The SciCo and the CO can start looking at consumers immediately after datataking begins. Some plots may require larger statistics, but it is worthwhile to check for obvious problems like errors in TrigMon plots, large regions of a detector which appear to be dead, etc. If specific problems were seen in a previous store or if work was done between stores, check the relevant plots.

Ensuring that the detector is working properly

- Work closely with the CO in checking monitoring plots
- Follow up on issues from previous shifts
- Lead the investigation of problems or concerns observed in the consumer monitoring plots, trigger rates, detector front-end readout, HV, etc, by checking the relevant monitoring plots and consulting with experts
- Make sure problems and details of troubleshooting are well documented in the e-log

- If you are working with a remote CO, you will have additional tasks…

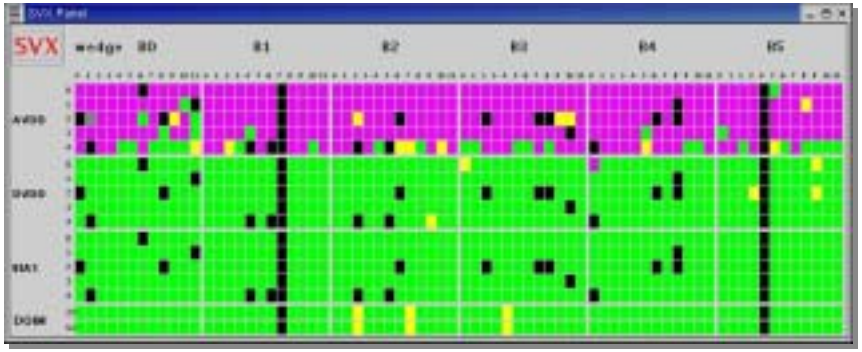
Ensuring that data is being taken efficiently

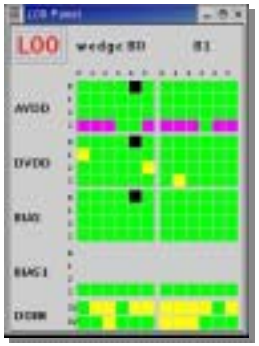
- Instill a sense of urgency to the shift crew
- Page experts (day or night) when help is required
- Page the OpsManager day or night when unsure how to respond to a situation or when problems are not able to be resolved in a timely manner (Never spend more than 15-20 minutes on a problem without seeking help. Use good judgement and page even sooner if needed.)
  - Use good judgement too e.g. if you are on owl shift and expert help may not be required immediately

SciCo Silicon Responsibilities

- Silicon should **not** be included in running with **non-standard** trigger/detector conditions
  - If in doubt: say NO, page Silicon
- If the **CDF clock** glitches or is lost, the detector will trip
  - Do NOT change clock modes
  - Note that the accelerator guys SHOULD NOT reboot the Low Level RF (LLRF) until the silicon has been turned off
    - If MCR calls asking to do this, tell them to wait until we are ready, page silicon
  - Always page Silicon for any clock problems
- The shift crew must **monitor beam conditions** whenever there is beam in the Tevatron
- The SciCo must be prepared to respond to **critical alarms** if the Ace is occupied (more details later)
- The SciCo is responsible for taking care of **silicon pinkies** (silicon ladder current outside of acceptable range)

IMON: Silicon Current Monitor



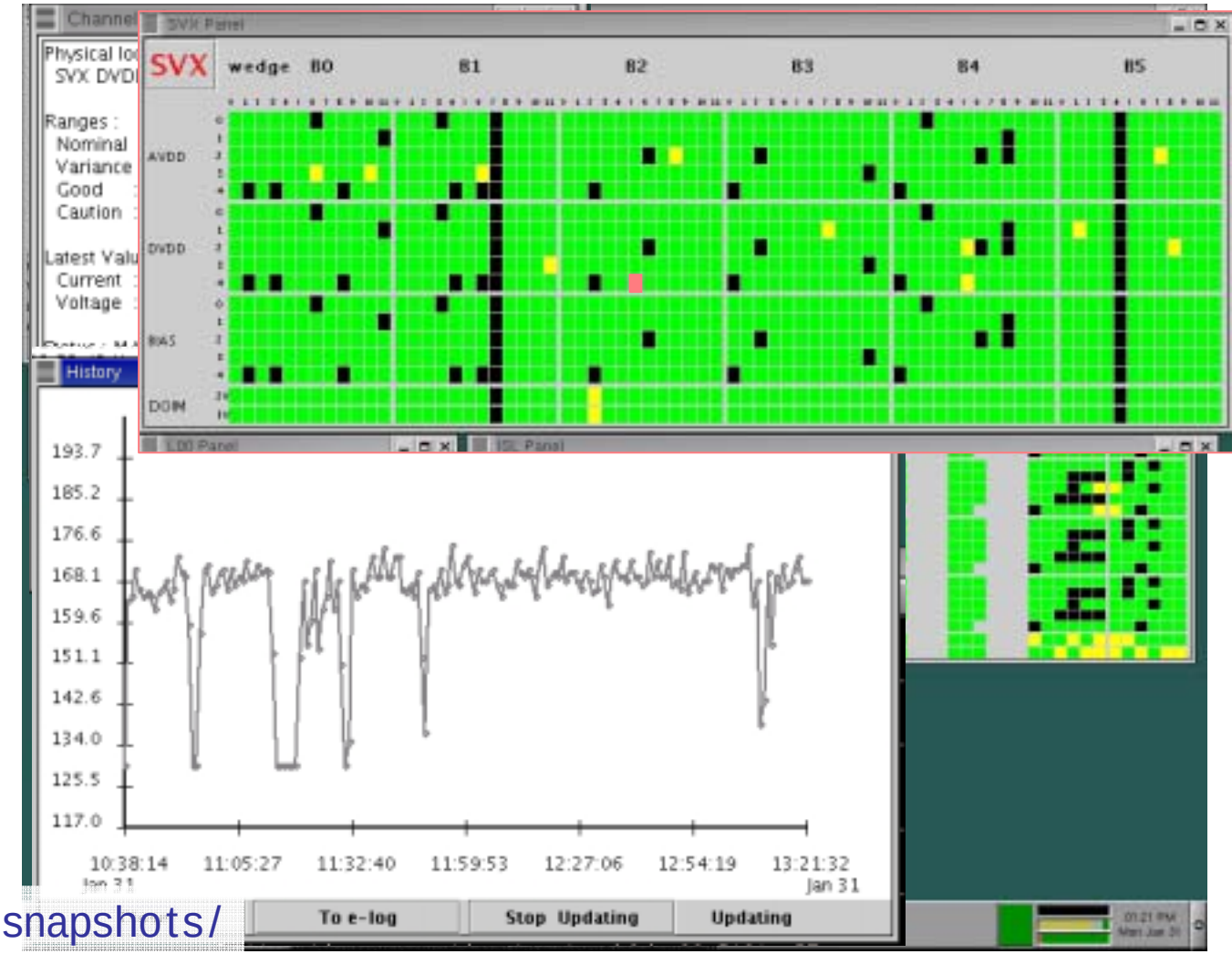


green:	ok	red:	trip
yellow:	warning	black:	off
pink:	problem	blue:	no comm.
grey:	ignored		

- Analog/digital part of chip (AVDD/DVDD):
  - High current if chip is in funny state
  - Low current if chip dead
- Bias current of Silicon sensor:
  - Increases slowly with radiation damage of sensors
  - Sudden jump: pinhole in sensor
- DOIM currents (optical transmitter on port card):
  - Variation with temperature
- Pink cells (“pinkies”)

IMon : What to do with a PINKY

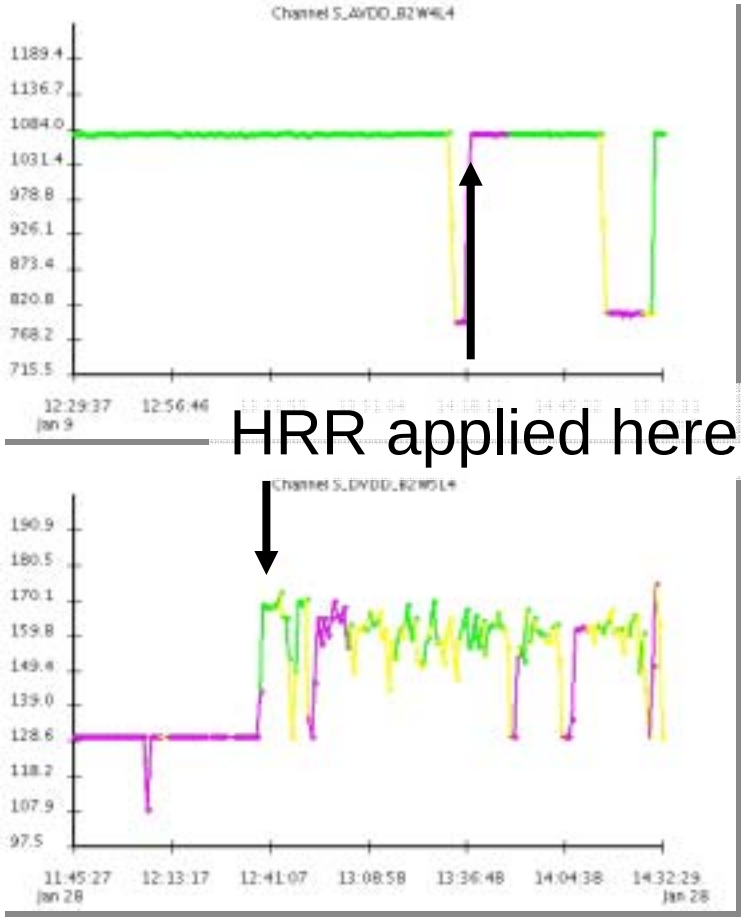
1. Click on the cell to get the panel
2. Note the cell name from panel eg:‘SVX DVDD Barrel2 Wedge5 Layer4’
3. Click on the “Show History”
4. Click on “To e-log” to get the snapshot, if unmark doesn’t work
5. Plots are saved under:



b0dasvx**:~svxii/imon/snapshots/

IMON – Example of a sensitive cell

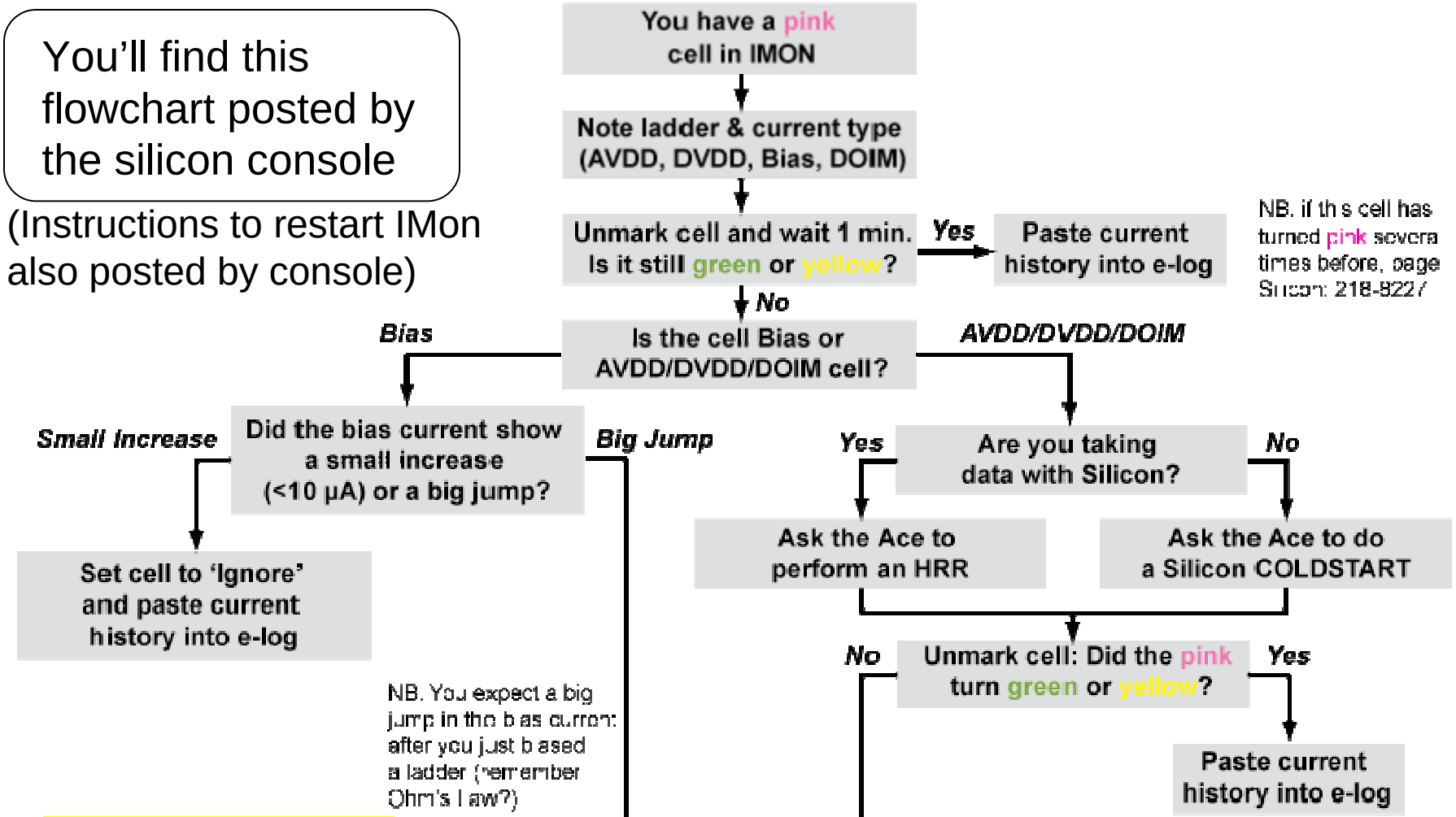
- Pinkies latch: try to unmark pink cell first
- Check history. If cell turns pink again after a minute: ask Ace to issue HRR
  - Readout chips are re-configured, current back to normal
  - Note: HRRs have no effect on bias currents
- Page Silicon (218-8227) if:
  - AVDD or DVDD cell stays persistently pink
  - Pinkie due to big jump in bias cell



Silicon Pinkie Flowchart

You'll find this flowchart posted by the silicon console

(Instructions to restart IMon also posted by console)



NB: You should also page Silicon whenever you have a large number of pink cells (>5)

Silicon HV

(from silicon Ace training slides)

- OFF
  - Everything is OFF
  - Readout chips are OFF
  - HV on Silicon sensors are OFF
  - **Expert only operation** or caused by interlock system
- STANDBY
  - Readout chips are ON
  - HV on Silicon sensors are OFF
  - Default state for Silicon
- ON
  - Readout chips are ON
  - HV on Silicon sensors are ON
  - The Silicon must not be ON unless beam is safe

TevMon

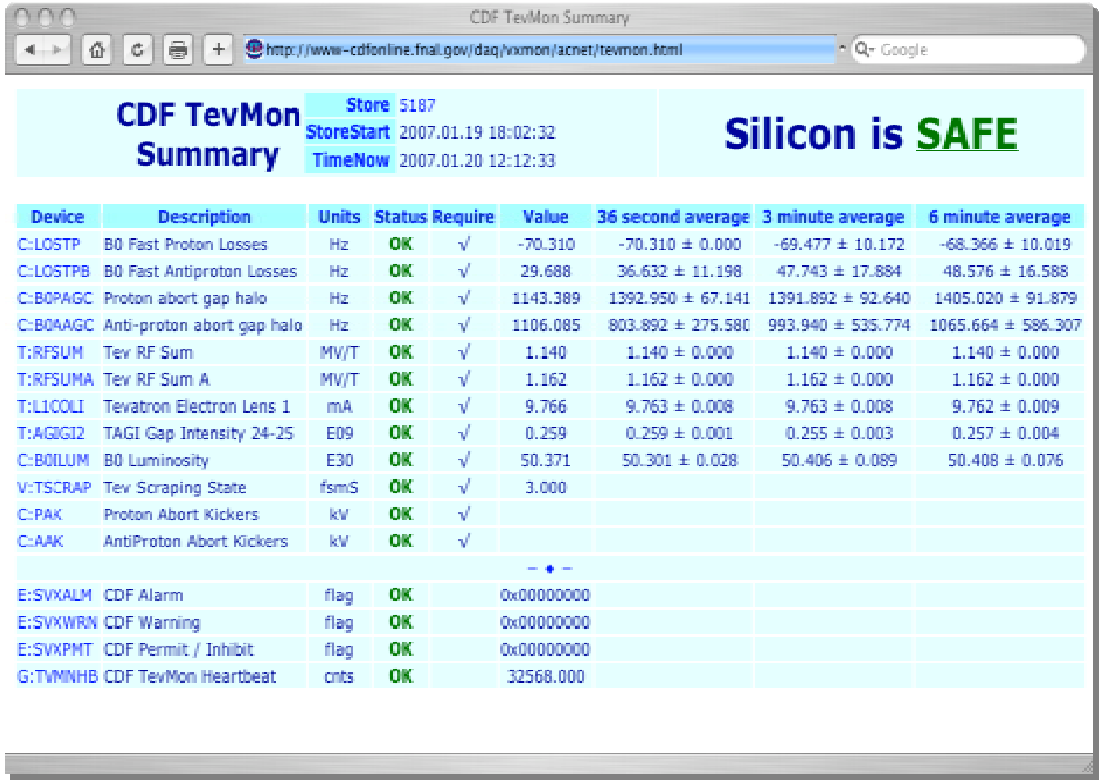
(from silicon Ace training slides)

- TevMon: automatic tool to evaluate beam conditions:
  - Monitors key beam parameters: losses, RF, abort gap, …
  - Issues audio-alarms for bad beam conditions
  - Creates web page with the current readings & status
- Three states:
  - Green = OK: beam conditions are safe
  - Pink = Warning: beam conditions may be unsafe
  - Red = Alarm: beam conditions are unsafe
- TevMon helps to evaluate beam conditions, it does not replace your vigilance
- Shift crew must obey TevMon:
  - Silicon must not be biased unless TevMon is Green
  - TevMon PINK : Shift crew must pay extra attention to Fast Time Plotter, consult Main Pager Carrier (218-8227) in case of questions or concerns
  - TevMon RED: Biased silicon must be put to STANDBY
  - Only Silicon SPLs can override TevMon

Beam Monitoring: TevMon

(from silicon Ace training slides)

- TevMon: automatic tool to evaluate beam conditions:
  - Monitors key beam parameters: losses, RF, abort gap, …
  - Issues audio-alarms for bad beam conditions
  - Creates web page with the current readings & status



CDF TevMon Summary

Store 5187
StoreStart 2007.01.19 18:02:32
TimeNow 2007.01.20 12:12:33

Silicon is SAFE

Device	Description	Units	Status	Require	Value	36 second average	3 minute average	6 minute average
C:LOSTP	B0 Fast Proton Losses	Hz	OK	√	-70.310	-70.310 ± 0.000	-69.477 ± 10.172	-68.366 ± 10.019
C:LOSTPB	B0 Fast Antiproton Losses	Hz	OK	√	29.688	36.632 ± 11.198	47.743 ± 17.884	48.576 ± 16.588
C:B0PAGC	Proton abort gap halo	Hz	OK	√	1143.389	1392.950 ± 67.141	1391.892 ± 92.640	1405.020 ± 91.879
C:B0AAGC	Anti-proton abort gap halo	Hz	OK	√	1106.085	803.892 ± 275.580	993.940 ± 535.774	1065.664 ± 586.307
T:RFSUM	Tev RF Sum	MV/T	OK	√	1.140	1.140 ± 0.000	1.140 ± 0.000	1.140 ± 0.000
T:RFSUMA	Tev RF Sum A	MV/T	OK	√	1.162	1.162 ± 0.000	1.162 ± 0.000	1.162 ± 0.000
T:L1COLI	Tevatron Electron Lens 1	mA	OK	√	9.766	9.763 ± 0.008	9.763 ± 0.008	9.762 ± 0.009
T:AGBGI2	TAGI Gap Intensity 24-25	E09	OK	√	0.259	0.259 ± 0.001	0.255 ± 0.003	0.257 ± 0.004
C:B0ILUM	B0 Luminosity	E30	OK	√	50.371	50.301 ± 0.028	50.406 ± 0.089	50.408 ± 0.076
V:TSCRAP	Tev Scraping State	fsmS	OK	√	3.000			
C:PAK	Proton Abort Kickers	kV	OK	√				
C:AAK	AntiProton Abort Kickers	kV	OK	√				
E:SVXALM	CDF Alarm	flag	OK		0x00000000			
E:SVXWRN	CDF Warning	flag	OK		0x00000000			
E:SVXPMT	CDF Permit / Inhibit	flag	OK		0x00000000			
G:TWMNHB	CDF TevMon Heartbeat	cnts	OK		32568.000			

Shift crew **must obey TevMon**:

- Silicon must not be biased unless TevMon is **SAFE**
- TevMon **WARNING**: Shift crew must pay extra attention to Fast Time Plotter, consult Main Pager Carrier (**218-8227**) in case of questions or concerns
- TevMon **DANGER**: Biased silicon must be put to STANDBY (future: will be done automatically if you don't react)
- Only Silicon SPLs can override TevMon

Loss monitors

- Please note that many of the beam loss monitors are CDF systems (LOSTP, LOSTPB, B0PAGC, B0AAGC, etc)
- If there appear to be readout problems with these counters, please contact the CDF experts first before questioning MCR
  - (Rick Tesarek for B0PAGC or Koji Terashi for LOSTP)
  - Note that it is not unusual for LOSTP to give a negative reading when the losses are low (due to an average pedestal subtraction)

Silicon Danger

- The SciCo must be trained to handle any time-critical alarms in case the Ace is not in the control room, for example, silicon cooling and radiation alarms, or setting HV to standby in the event of high losses or other accelerator problems.

TevMon alarm

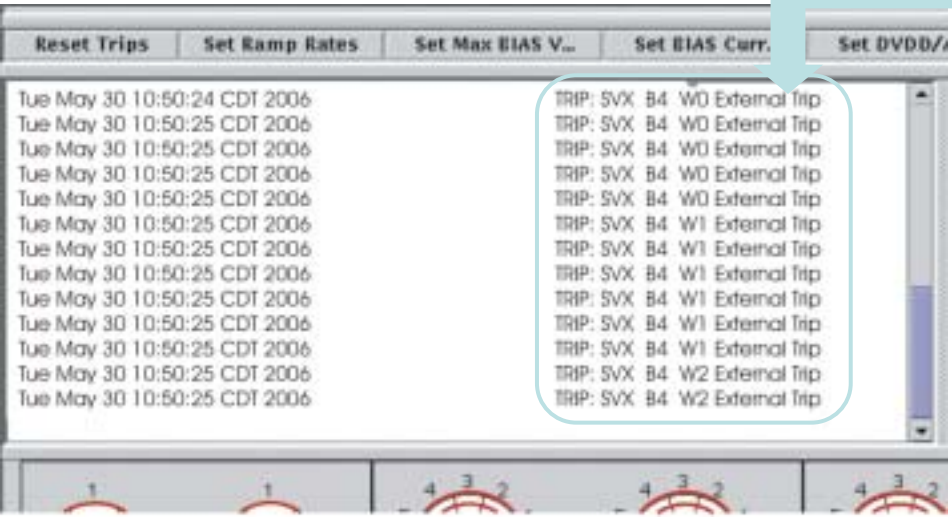
- The SciCo is responsible for knowing how to set the silicon HV to **standby** in case TevMon alarms and the Ace is otherwise occupied

- If the losses are very high (>50kHz) the HV for the COT and muon chambers should be set to standby as well
  - The easiest way to do this is to hit the **End Of Store** button. (Note that this will also turn off the CLC.)
  - Contact MCR to let them know that the HV is at standby and to learn the cause of the high losses

Silicon Cooling Alarm Fires!!

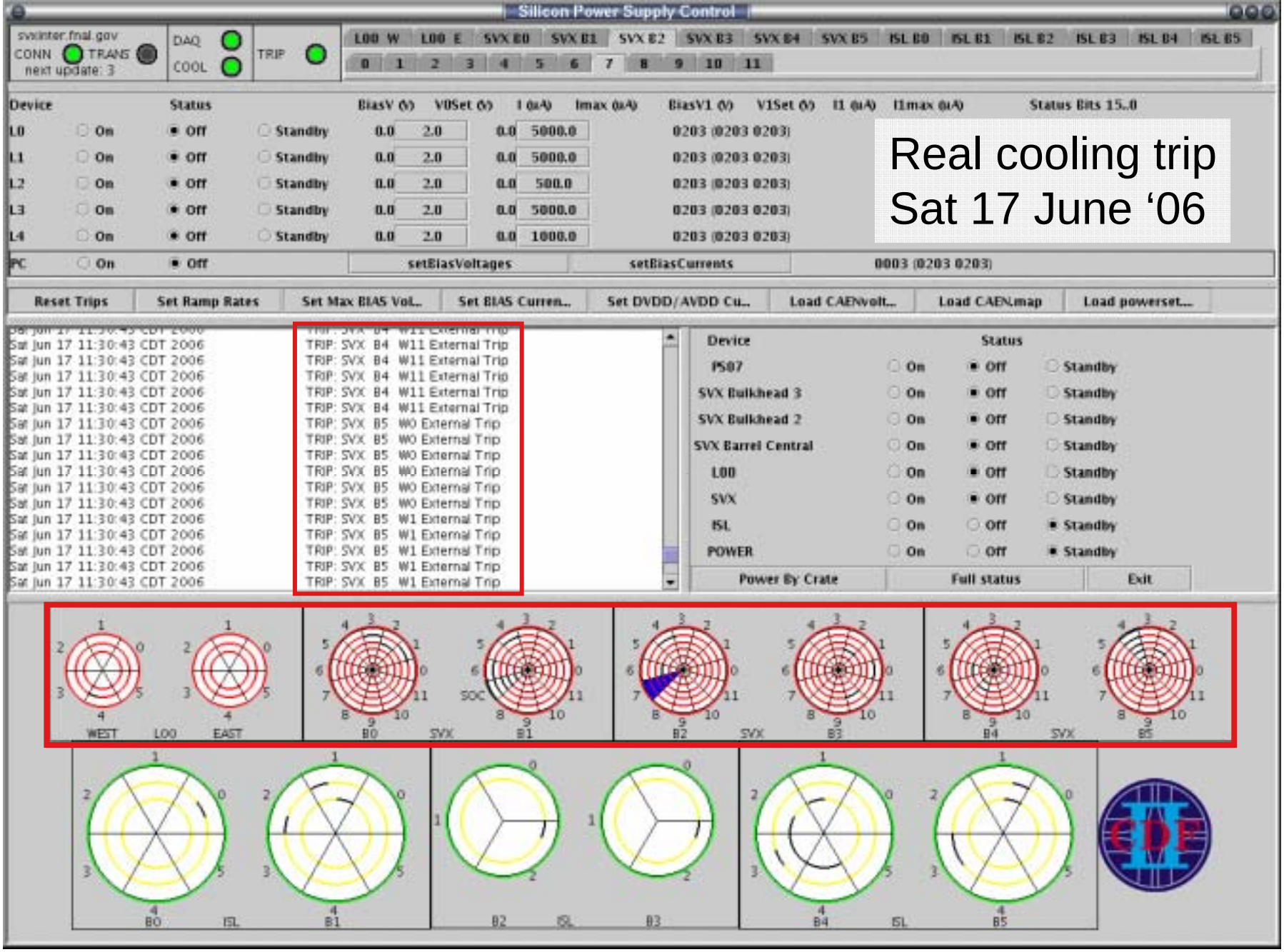
(from silicon Ace training slides)

The SciCo must be prepared to handle this in the event the Ace is not in the control room!



- You hear a loud screech
- One or more of the Silicon cooling LEDs is off
- Check that the corresponding detectors are **OFF**
  - Check the PS-GUI !!
  - Do you see “External Trip”?
- Take a deep breath… cannot confirm the detector is OFF after 1 minute
  - HIT THE CRASH BUTTON

- Page Silicon: 218-8227
- Page Cooling: 218-8626



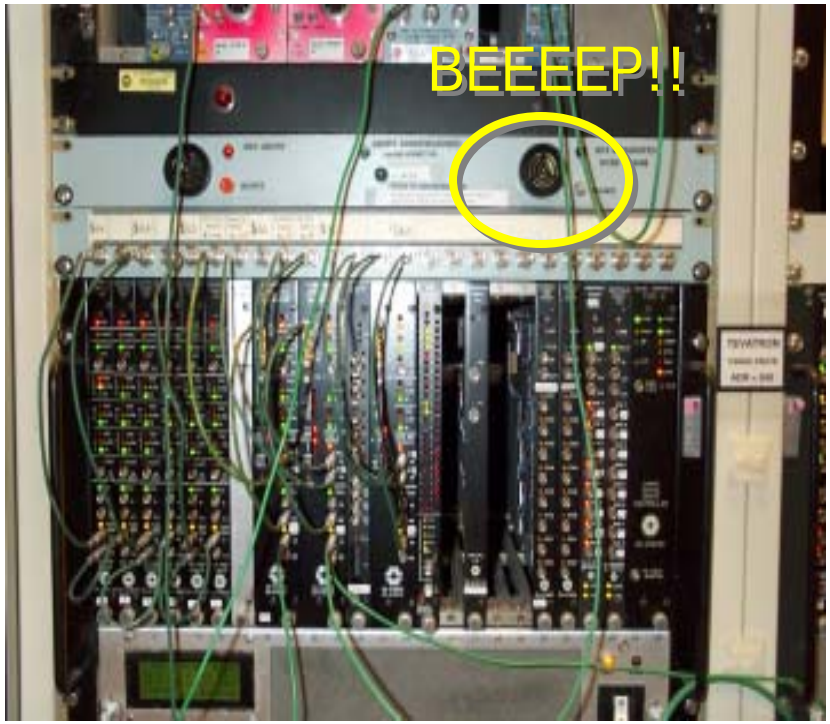
Real cooling trip
Sat 17 June '06

Real Cooling Trip

(from silicon Ace training slides)

Silicon Integrated Dose Alarm

(from silicon Ace training slides)

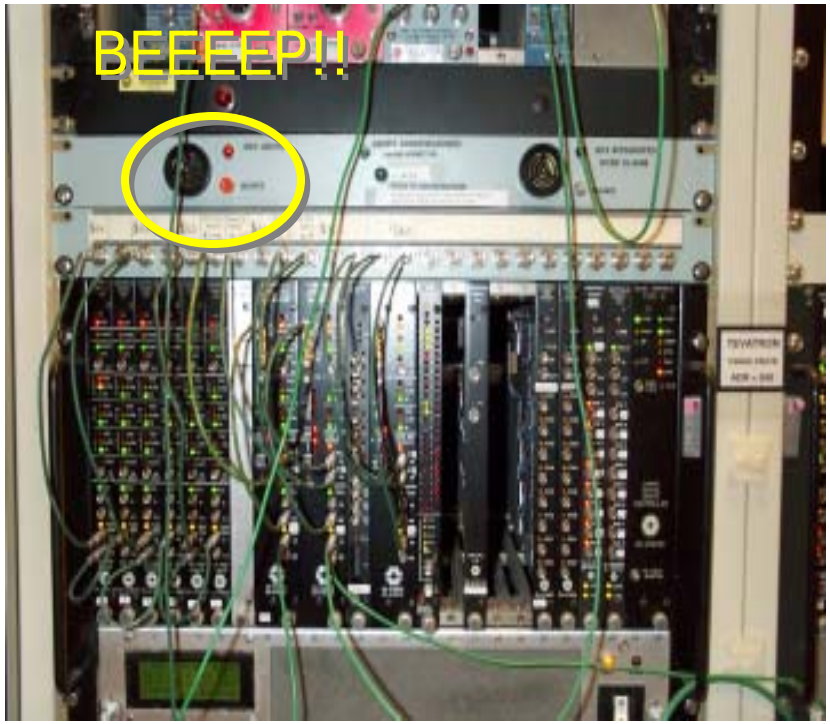


*Conversion to SI units: 100 rad = 1 Gy

- Sono-alarm goes off if >19 rad* in the last minute
- Beam still in the machine
- Silence alarm, call MCR, page RadCo (“Radiation Control Officer”): 266-2713
- Watch radiation dose and beam losses closely!
- RadCo & SPLs evaluate incident, advise shift crew
- Happened a lot in late 2005, usually during Tevatron squeeze, not observed after 2006 shutdown

Silicon Radiation Abort

(from silicon Ace training slides)



- Beam permit dropped and beam aborted if dose rate exceeds 12 rad/s, sono-alarm goes off
- Shift crew silences alarm, pages RadCo (266-2713) and Silicon Main Pager (218-8227)
- RadCo resets BLM electronics, documents incident
- Don't press "abort acknowledged" button!
  (Allows MCR to put beam into the Tevatron. This is done by Ops Manager in consultation with RadCo and Silicon SPLs after beam incident is fully understood)

Communication with MCR

(adapted from silicon Ace training slides)

- CDF, in particular the silicon group, is very serious about good beam conditions. Many procedures require communication with MCR
- The SciCo must ensure that MCR does not perform drastic changes of the beam conditions while the Silicon is biased
- Correct way of communication with MCR
  - MCR calls: “We would like to do XYZ.”
  - SciCo: “Please wait, we will call you back when we are ready.”
  - Put Silicon to STANDBY (if unsure, consult with Silicon expert)
  - After Silicon is in STANDBY, SciCo calls MCR: “Go ahead. Please call back when you are done.”
  - After MCR reports that they are finished: check if beam stable, bring Silicon back to ON
- If MCR calls and you do not understand what they are telling you, ask for more information and talk to the Ops Manager if necessary